326.M
636.M

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT INVESTIGATIONS

REPORT OF PINE BEETLE SURVEYS ON THE MALHEUR NATIONAL FOREST SEASONS OF 1941 AND 1942

By

W. J. Buckhorn
Senior Scientific Aide
Bureau of Entomology and Plant Quarantine

March 1943

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon

U. S. GOVERNMENT PRINTING OFFICE 60918

Report of Pine Beetle Surveys on the Malheur National Forest Seasons of 1941 and 1942

Approved by

F. P. Keen
Senior Entomologist, in Charge

Submitted by

W. J. Buckhorn
Senior Scientific Aide

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon
March 1943

ABSTRACT

Basis

Data presented are from the eleventh (1941) and twelfth (1942) annual pine beetle surveys.

Status of Infestation

1940: The average trend of infestation was downward for the forest. Increases occurred on the north half of the Malheur River Area and on Hiyu, Canyon Creek, and Bear Valley Units. Centers of moderate epidemic infestation were present on Hiyu, Canyon Creek, Bear Valley, Beech Creek, Flagtail, Sawtooth, Crow Flat, and Calamity Units. A light epidemic was present in much of the fringe type. Elsewhere a normal infestation prevailed.

1941: Infestation declined generally and losses were the lowest since 1930. Infestation was normal except for a light epidemic in portions of the fringe type.

1942: A moderate increase is indicated. No aggressive centers are present.

Bear Valley - Canyon Creek Control Project

Control on 22,260 acres was successfully carried out during the winter of 1940-41.

Estimated Forest Losses

During the period 1931 to 1939 inclusive, 627,690,000 board feet of ponderosa pine are estimated to have been killed by pine beetles on this forest.

Season of loss	No. of Trees	Volume MBM	Board Ft. Per Acre	Percent of Stand
1940	75,155	45,287	44	0.57
1941	47,161	29,290	29	0.37

Recommendations:

No direct control is necessary.

Introduction

Surveys to determine the extent and seriousness of forest insect depredations in the ponderosa pine stands within and adjacent to the Malheur National Forest have been conducted annually since 1931. These surveys have been carried out on a cooperative basis between the Forest Service and Bureau of Entomology and Plant Quarantine.

The 1941 and 1942 surveys consisted of a 100 percent cruise of current insect losses on 320-acre check plots. In addition to cruising insect losses on the plots, the 1942 survey crew made a 10 percent cruise of the green stand. This green stand cruise was made by ¼-acre, random, circular plot method in which the ponderosa pine was tallied by diameter and California risk class. The 1941 survey completed the 1940 loss data and the 1942 survey completed the 1941 loss data and gave preliminary information on the 1942 loss trend.

Twelve plots were covered during 1941. Cutting of the Flagtail plot reduced this number to eleven in 1942. The 1941 survey was carried on during the period October 2-18 by Messers. W. V. Masson, E. Sutherland, and B. Fielder. These men were trained and supervised by Mr. A. J. Jaenicke of the Forest Service Regional office. The 1942 survey was carried on by two crews during the period October 20 - November 3. Crew No. 1: Messers F. T. Houston and Joe Mason were employed by the Forest Service, trained by Mr. R. L. Furniss of this office, and operated under the supervision of Mr. R. C. Hall of the Bureau station at Berkeley, California. Crew No. 2: Messers M. W. Watson and S. F. Elliott were employed by the Forest Service, and were trained and supervised by the writer.

During 1942 the writer observed the losses over much of the forest. These general observations combined with plot records were the basis upon which estimates of losses occurring during 1940 and 1941 were made for the forest as a whole.

Past Losses

Climatic factors adverse to tree growth enabled an infestation quiescent prior to 1930 to rapidly develop into an epidemic that reached its greatest intensity during 1932. During that season 5.14 percent of the stand on the Sawtooth plot was killed and losses for all plots averaged 3.10 percent of the stand.

The upward trend of infestation was abruptly halted during the winter of 1932-33 by extreme subzero temperatures that caused wide spread mortality to overwintering broods of the pine beetle. This mortality coupled with improved tree growth resulted in a decline of infestation to a low point in 1934 when plot losses averaged only 0.43 percent of the stand killed. A flare up occurred during 1935 but largely subsided during 1936. The infestation again increased through 1937 and 1938 but began to decline in 1939. Average annual losses on check plots is shown graphically in Figure 1.

During the period 1931 to 1939 inclusive, approximately 627,690,000 board feet of ponderosa pine timber was killed on the forest by insects. For a more detailed breakdown of this loss refer to the three previously issued office reports covering the period 1931-37 and the individual years 1938 and 1939.

Plot Losses 1940 - 1942

The infestation continued the downward trend which began in 1939. In 1940 plot losses declined 15 percent to an average of 79 board feet per acre. A further reduction of 43 percent occurred in 1941 during which year average plot losses were 45 board feet per acre. This marks the lowest level of infestation since the epidemic began in 1930.

Although the average trend was downward during these two seasons, conditions on individual plots varied considerably. During 1940 increases on six of the plots ranged from 15 to 95 percent. Four of the plots, Marsdon, Mahogany Spring, Summit Creek, and Crane Prairie, being grouped on the north half of the Malheur River Area, indicate a general increase of infestation on that portion of the forest. A sharp increase occurred on the Hiyu plot. Unusually high infestation has prevailed on this plot since 1938. The increase on the Long Creek plot was of no significance due to the extremely low level of infestation. Infestation on five of these plots declined during 1941. The Crane Prairie plot, however, continued to show an increase. This upward trend may have been due to the large amount of wind-throw that occurred during the late winter and early spring of 1941. Fifty-seven down trees containing approximately 52,900 board feet were marked on this plot.

The 1942 survey was carried on at a time when only 74 to 82 percent (Grant's Curve) of the 1942 loss was perceptible. These preliminary data indicate that the infestation increased approximately 35 percent during 1942.

Location of the 12 plots covered during 1941 and the 11 plots covered during 1942 are shown on Figure 2. Insect loss data secured on the plots is given in Table 1. Average loss trend on the plots during 1940 and 1941 is graphically shown on Figure 1.

Forest Conditions During 1940 and 1941

1940

Favorable conditions for tree growth during 1940 were reflected in an average decrease of 12 percent in the gross loss for the entire forest; however, losses on local areas varied considerably. Conditions on Areas and units during 1940 were as follows:

On the John Day Area the trend of infestation was downward except in the Hiyu, Beach Creek, and Canyon Creek centers where infestation continued aggressive and increased somewhat. Losses were generally within normal limits. Exceptions were the fringe type west of Beech Creek, where there was a light epidemic, and three centers of moderate epidemic infestation, as follows: east side of Beech Creek, Beech Creek Unit; lower portion of Camp Creek, Hiyu Unit; and all of Canyon Creek Unit except the stands at high elevations.

Infestation decreased on the Silvies and Snow Mountain Areas except on the Bear Valley Unit where some increase occurred. Normal losses were prevalent except for a light epidemic in much of the fringe type at low elevations on south and west exposures and a moderate epidemic in: (1) The lower portion of Murderers Creek drainage, Flagtail Unit; (2) the south one-third of Sawtooth Unit; and (3) selectively cut stands southwest and northeast of Bear Valley, Bear Valley Unit.

A downward trend on the Malheur River Area was evident on Crow Flat and Calamity Units; whereas, some increase occurred on the other five units of this area. Losses were generally normal. A light epidemic was present in the fringe-type stands around the south and west side of the area and also in the following three centers: (1) West of King Mountain, Crow Flat Unit; (2) west of Calamity Butte, Calamity Unit; and (3) the lower portion of Bear Creek drainage, Bridge Creek Unit.

1941

A general decline of infestation occurred over the entire forest during 1941. Gross losses decreased 28 percent. The Bear Valley and Canyon Creek centers of moderate epidemic infestation that showed aggressive tendancies in 1940 were reduced to normal following control operations in the winter of 1940-41. Other centers of moderate epidemic infestation declined to a light epidemic status. Much of the light epidemic infestation in fringe-type areas declined to or below normal. As a result of this general decline, infestation on the Malheur in 1941 was at the lowest level since the epidemic began in 1930.

Estimates of losses occurring during 1940 and 1941 are given by areas and units in Table 2. The intensity and distribution of the 1941 infestation is shown graphically in Figure 2.

Control Work, Winter of 1940-41

An infestation began building up in 1937 and gradually became very aggressive causing an alarming depletion of residual stands on selectively logged areas on the Bear Valley unit, and heavy losses in virgin stands on adjacent units. The availability of C.C.C. labor made it desirable to attempt to reduce these losses to a more nominal figure. Control was recommended in the fall of 1940 by this office and was successfully carried out by the Forest Service during the winter of 1940-41.

Both treating and salvage logging methods were utilized. Treating was done by C.C.C. labor from Camp Canyon Creek under the supervision of foremen trained in control work. The Edward Hines Company carried on the salvage logging. Spotting was done by crews composed of key men from the short-term fire protection force.

The infestation was more or less confined to three centers, the largest of which existed in selectively logged stands and adjacent virgin stands on the divide between Bear Valley and Canyon Creek northeast of Bear Valley. The other two centers were in selectively logged stands to the southwest of Bear Valley, one on the lower reaches of Jack Creek, the other around Bear Valley Ranger Station.

The spotters covered 22,260 acres on these three areas and marked 1,704 trees, an average of 49 per section. 1,341 spotted trees and 16 pickups were treated by the C.C.C. enrollees in the Canyon Creek center. The Hines Company logged and salvaged, without cost to the Government except for spotting, 252 trees in the Jack Creek center. Spotting crews treated 111 trees in the Bear Valley station and Jack Creek centers.

Rough topography and deep snows made operations difficult and increased the cost considerably. Project costs were as follows:

Spotting	1,704 Trees	at $1.14 per tree	$ 1,936.00
Treating	1,468 Trees	at 6.95 per tree	$10,205.12
Total cost		at $8.09 per tree	$12,141.12

C. C. C. funds	$ 8,674.12
S. and E. funds	$ 3,467.00
Total	$12,141.12

The number of infested trees spotted on the project fell below expectations. This was largely due to two factors: (1) Composition of infestation. Trees entirely infested by flatheads (Melanophila californica V. D.) were not marked for treating. This type of tree averaged from 20 percent of the trees examined on good sites to 60 percent on poor sites. (2) Decline of infestation. Estimates of the number of infested trees on the project were based on conditions found on the survey which was made on this section of the forest on September 9. On the basis of past experience approximately 51 percent of the seasonal loss should have been present when the survey was made; however, infestation in 1940 did not follow the normal pattern. Early in the season infestation increased rapidly, but later it became less aggressive and declined. Consequently, a much higher percentage of the loss was marked in September than would usually be the case. This discrepancy was not evident until spotting for the control project was under way.

Even though the infestation assumed a downward trend, the control work undoubtedly saved much additional timber as data on the Marsdon plot, which was treated, indicate that the decline of infestation was greatly accentuated on the areas covered by control. On this plot the ratio of the 1941 loss to the 1940 loss was .27, a decrease of 73 percent, while for all plots the ratio of the 1941 loss to that of 1940 was .57, a decline of 43 percent.

Recommendations

No aggressive centers of infestation were found during 1941 or 1942 and no control is recommended.

Table No. 1

Malheur — Insect Caused Ponderosa Pine Losses on Virgin Check Plots

Area and Units	Check Plots: Plot	Timbered Acreage	Pine Vol.Bd.Ft. as of Jan.1,194	1940 Losses: No. of Trees	Board Feet: Volume	Per Acre	% of Stand	Ratio to 193	1941 Losses: No. of Trees	Board Feet: Volume	Per Acre	% of Stand	Ratio to 1940
JOHN DAY													
Long Creek	Long Creek	320	2,946,060	9	5,350	17	.18	1.22	4	5,050	16	.17	.95
Rudio Mtn.	Rudio	245	3,576,780	7	4,260	17	.12	.51	7	9,010	37	.25	2.12
Hiyu	Hiyu	320	2,491,395	89	39,160	122	1.57	1.95	43	27,790	87	1.10	.71
Beech Cr.	Beech Cr.	313	2,504,525	74	45,280	145	1.80	.65	55	44,960	144	1.80	.99
Area Total		1,198	11,518,760	179	94,050	79	.82	.92	109	86,810	72	.75	.92
SILVIES													
Flagtail	Flagtail	320	5,079,525	12	14,250	46	.28	.47	*35	*17,290	*54	*.34	*1.21
SNOW MTN.													
Sawtooth	Sawtooth	320	5,018,635	30	15,680	49	.31	.39	13	7,380	23	.15	.47
MALHEUR RIVER													
Bridge Cr.	Marsden	320	4,574,350	93	55,282	173	1.21	1.15	21	14,740	46	.33	.27
	Bridge Cr.	320	5,015,790	22	19,860	62	.40	.57	13	15,280	48	.31	.77
Crow Flat	Williams Ranch	320	5,430,790	51	22,260	70	.41	.70	18	10,600	33	.20	.47
Middle Fork	Mahogany Spr.	320	3,779,450	48	37,260	116	.99	1.27	36	30,440	95	.81	.91
Summit Cr.	Summit Cr.	320	4,442,535	13	15,410	48	.35	1.21	12	11,990	37	.27	.78
North Fork	Crane Prairie	320	8,505,100	22	21,410	57	.25	1.18	26	27,350	85	.32	1.28
Area Total		1,920	31,748,015	249	171,482	89	.54	.98	126	110,400	57	.35	.64
FOREST TOTAL	12 Plots	3,758	53,364,935	470	295,462	79	.55	.85	248	170,470	45	.32	.57

* Plot cut over in 1942. Estimate of total loss based on that portion of seasons loss marked on survey of 1941.

Table No. 2

Insect Caused Ponderosa Pine Mortality

Area and Units	Pine Type Acres			Total Volume M.B.M.	Estimated 1940 Loss					Estimated 1941 Loss				
	Virgin	Cutover	Total	Jan. 1, 1940	Trees	Volume M.B.M.	Trees Per Sec.	Bd.Ft. Per Acre	% of Stand	Trees	Volume M.B.M.	Trees Per Sec.	Bd.Ft. Per Acre	% of Stand
JOHN DAY														
Long Creek	16,220	3,240	19,460	203,600	900	510	29	26	.25	500	290	16	15	.14
Rudio Mtn.	81,680	—	81,680	540,200	2,940	1,765	23	22	.33	1,720	1,025	14	13	.19
Hiyu	26,470	14,210	40,680	491,900	3,790	2,272	60	56	.46	2,410	1,445	38	36	.29
Beech Creek	86,440	2,240	88,680	644,000	6,525	3,900	47	44	.61	6,000	3,600	43	41	.56
Fields Peak	25,760	—	25,760	59,500	700	350	17	14	.59	460	230	10	9	.39
Canyon Cr.	58,880	4,000	62,880	299,000	9,420	5,500	96	87	1.84	2,250	1,350	23	22	.45
Strawberry Mt.	38,260	3,600	41,860	163,800	2,130	1,010	33	24	.62	814	407	12	10	.25
Area Total	333,710	27,290	361,000	2,402,000	26,405	15,307	46	42	.64	14,154	8,347	25	23	.35
SILVIES														
Flagtail	96,784	—	96,784	641,100	6,250	5,000	43	52	.78	4,975	3,482	33	36	.54
Bear Valley	1,093	76,610	78,513	416,700	7,584	2,890	62	27	.69	3,950	1,382	32	18	.33
Myrtle	102,233	12,470	114,703	882,600	5,800	3,770	32	33	.43	3,440	2,402	20	21	.28
Area Total	108,920	89,080	290,000	1,940,400	19,634	11,660	43	40	.60	12,365	7,266	27	25	.38
SNOW MOUNTAIN														
Sawtooth	53,000	—	53,000	324,000	4,040	2,100	49	40	.65	2,265	1,360	27	26	.42

Table No. 2

Malheur — Insect Caused Ponderosa Pine Mortality

Area And Units	Pine Type Acres			Total Volume M.B.M. Jan. 1, 1940	Estimated 1940 Loss					Estimated 1941 Loss				
	Virgin	Cutover	Total		Trees	Volume M.B.M.	Trees Per Sec.	Bd.Ft. Per Acre	% of Stand	Trees	Volume M.B.M.	Trees Per Acre	Bd.Ft. Per Acre	% of Stand
MALHEUR RIVER														
Lake Creek	31,500	—	31,500	318,700	600	450	12	14	.14	570	427	12	14	.13
Summit Creek	32,140	—	32,140	459,900	990	840	20	26	.18	1,095	930	22	29	.20
North Fork	73,880	—	73,880	944,100	2,900	2,460	25	33	.26	3,000	2,550	26	35	.27
Bridge Creek	40,756	3,600	44,356	500,000	6,405	4,450	92	98	.89	3,350	2,450	48	55	.49
Middle Fork	42,700	2,240	44,940	478,300	5,196	3,600	73	80	.75	4,232	2,960	60	66	.62
Calamity	23,752	2,240	25,992	135,200	3,035	1,820	75	70	.97	1,645	980	41	38	.53
Crow Flat	48,162	13,030	61,192	430,100	5,950	2,600	62	42	.61	4,485	2,020	47	33	.47
Area Total	292,890	21,110	314,000	3,316,300	25,076	16,220	51	52	.49	18,337	12,317	37	39	.37
FOREST TOTAL	880,520	137,480	1,018,000	7,982,700	75,155	45,261	47	44	.57	47,161	29,290	30	29	.37

Figure No. 1

TREND OF CHECK PLOT LOSSES

MALHEUR NATIONAL FOREST

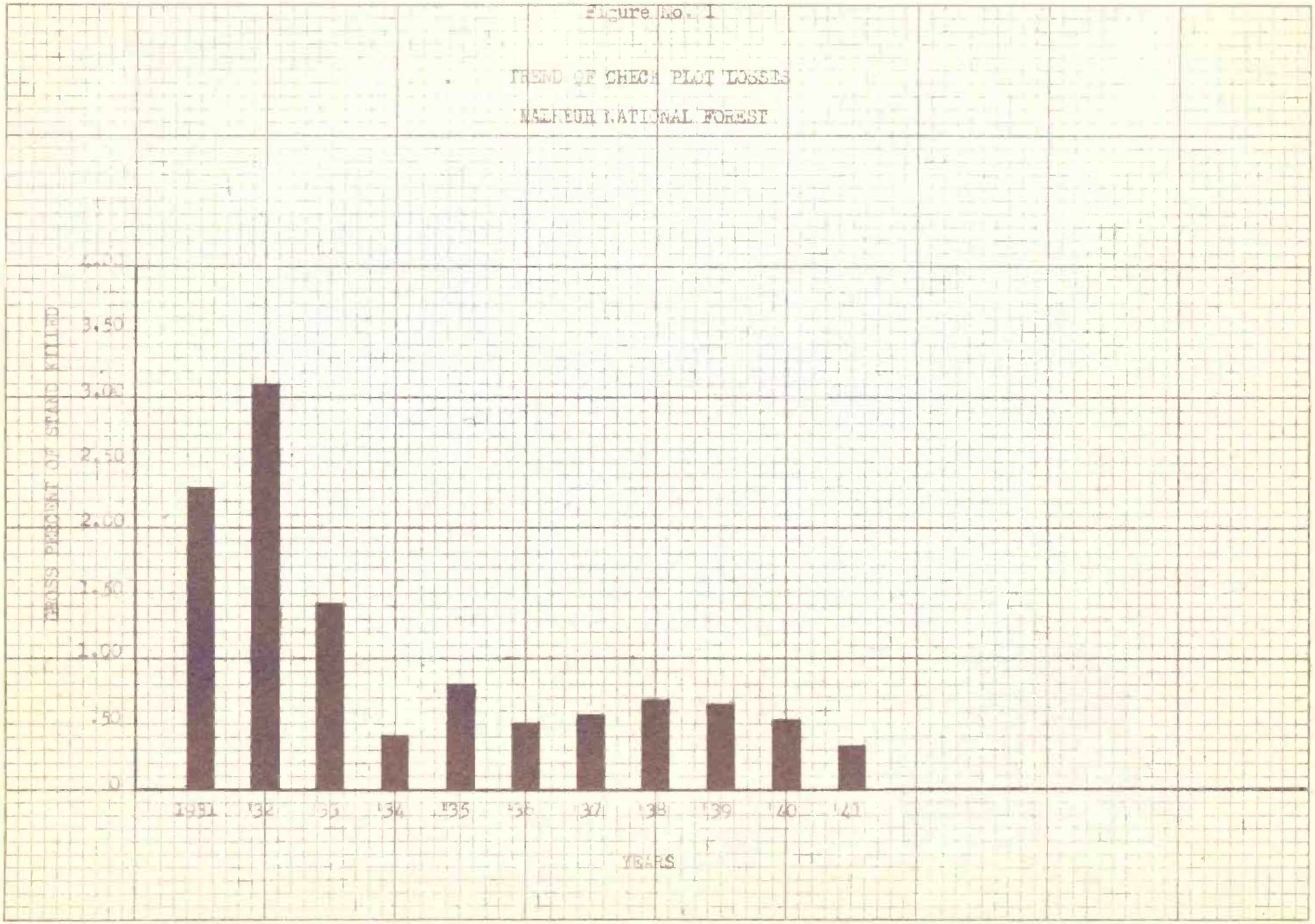
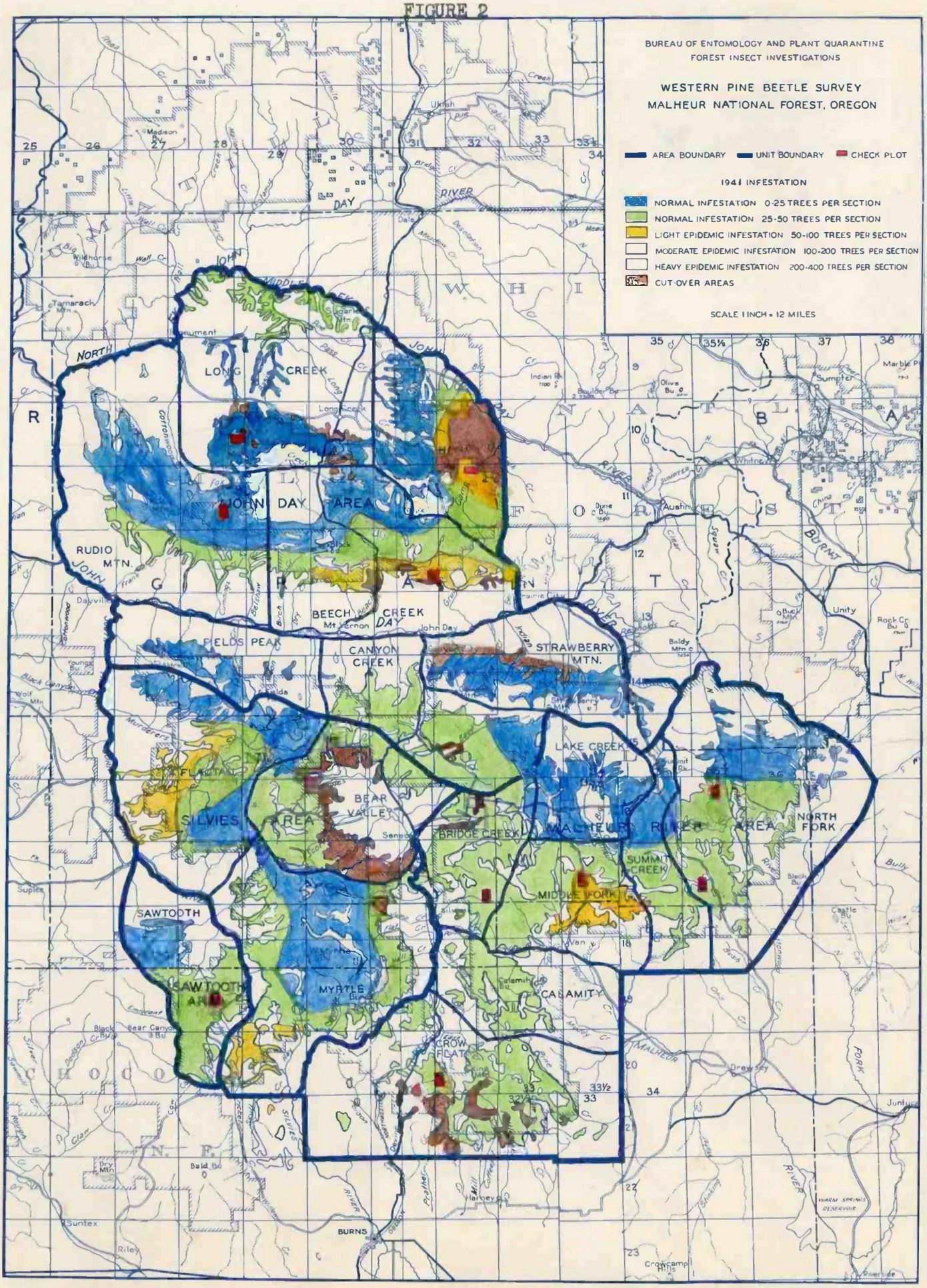


FIGURE 2


BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS
WESTERN PINE BEETLE SURVEY
MALHEUR NATIONAL FOREST, OREGON
AREA BOUNDARY
UNIT BOUNDARY
CHECK PLOT
1941 INFESTATION
NORMAL INFESTATION 0-25 TREES PER SECTION
NORMAL INFESTATION 25-50 TREES PER SECTION
LIGHT EPIDEMIC INFESTATION 50-100 TREES PER SECTION
MODERATE EPIDEMIC INFESTATION 100-200 TREES PER SECTION
HEAVY EPIDEMIC INFESTATION 200-400 TREES PER SECTION
CUT-OVER AREAS
SCALE 1 INCH = 12 MILES
LONG CREEK
JOHN DAY AREA
RUDIO MTN.
BEECH CREEK
Mt Vernon
FIELDS PEAK
CANYON CREEK
STRAWBERRY MTN.
LAKE CREEK
BEAR VALLEY
SILVIES AREA
BRIDGE CREEK
WALHEURE RIVER AREA
NORTH FORK
SUMMIT CREEK
MIDDLE FORK
SAWTOOTH
SAWTOOTH AREA
MYRTLE
CALAMITY
CROW FLAT
BURNS
Tamarack Mtn.
Madison Bu.
Wilkinsonville Bu.
Olive Bu.
Sumpter
Marble Pt.
Dixie Bu.
Austin
Unity
Baldy Mtn.
Dayville
Youngs Bu.
Wolf Mtn.
Murderers
Suplee
Black Bu.
Bear Canyon Bu.
Dry Mtn.
Bald Bu.
Suntex
Riley
Harney
Drewsey
Juntura
Crane Camp Hills
Riverside
WARM SPRINGS RESERVATION